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It was the purpose of this thesis to analyze statistically the general hypothesis that there exists an income differential between black and white females in the United States work force. The analysis utilized a modest econometric model and a "canned" program known as the Econometric Software Package.

The data were secured from the 1960 and 1970 Census of Population. Twenty traditionally southern and twenty non-southern SMSA's were sampled. The females included in the sample ranged in age from 14 to 65.

The results suggest that (1) statistically there is a difference in the earnings of black and white females, and (2) this difference in earnings may be attributed to productivity variables and not to labor market discrimination.

THE ECONOMICS OF RACIAL DISCRIMINATION: AN ECONOMETRIC STUDY OF THE EARNINGS GAP BETWEEN BLACK AND WHITE FEMALES FOR THE YEARS OF 1960 AND 1970

by

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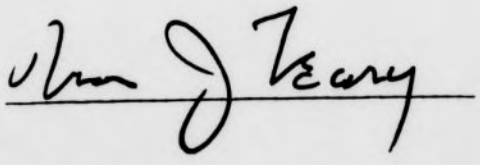

APPROVAL PAGE

This thesis has been approved by the following committee of the Faculty of the Graduate School at The University of North Carolina at Greensboro.

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July 20, 1976

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CHAPTER I

INTRODUCTION

Traditionally, the predominant occupation of women in the United States has been that of homemaker. However, increasing numbers of American women are securing paid work outside the home; they are adding other occupations to that of homemaker. The purpose of this thesis is to analyze statistically the general hyposthesis that there is an income differential between black and white females in the United States work force. The type of discrimination, then, that this thesis concerns itself with is racial discrimination among females.

Discrimination Defined

The problem of defining discrimination is a most difficult one. Generally, economists discuss discrimination in terms of cost, a term which also has several meanings. Discrimination, defined in very broad terms, occurs whenever market allocations are made such that non pecuniary or extraneous factors play a role--that is, for example, where race, religion, or sex affect the distribution of goods and services and jobs. (2, 1973, p. 1)

A long list of types of discrimination could be compiled, but most can be placed in one of the following categories: 1) employment discrimination occurs when unemployment, both full-time and part-time, is concentrated among minority groups; 2) wage discrimination occurs when minority workers are paid less for doing the same work as others; 3) occupational

discrimination occurs when criteria other than productivity determine the relative quantity of a factor employed in a given occupation; 4) human capital discrimination occurs when less is invested in the education and training of minorities than of others; 5) capital discrimination occurs when price or quantitive controls limit minority group members' ability to borrow from the capital markets or when the rate of return on their capital is artificially lower; 6) racial discrimination occurs whenever race is a factor in predicting the opportunities open to an individual; 7) sex discrimination occurs whenever sex is a factor in predicting the opportunities open to an individual and; 8) price discrimination occurs when minority group buyers are required to pay more than the market prices or when minority group sellers must sell at below market prices. (3, 1973 pp. 10-11) This definition is quite different from the definition of price discrimination found in microeconomic theory.

Racial Discrimination Among Females

Before proceeding further some interesting data should be noted. In 1969, black women working 50 weeks or more had a median income level of $4,126, about 80 percent of the $5,182 for white women who worked the same length of time (see Table 1.1). Among women 25 year and older, the median income for those who had only high school education was bout the same for blacks and whites. Black women who completed 4 years of college made sharper gains in income than white women. The median income of black women who had completed college was about $1,000 more than for white women with the same educational attainment (see Table 1.2). About one-fourth of all black women who were heads of families and worked in 1969 were below the poverty income level although they worked full-time (see Table 1.3). (Roughly

44 percent of black and other minority group mothers with young children who worked compared to roughly 27 percent of white mothers.) Among the married women who have no children under 5 years old about 63 percent of the women of black and other minority groups are in the labor force. White single women, however, are more often in the labor force than black and other minority group women. Thus, about 86 percent of white single women 25 to 29 years old in 1969 were in the labor force as compared to about 65 percent of single black women and of other minority group women in the same age category (see Table 1.4). A higher proportion of black than of white women are in service and private household occupations. Clerical and sales occupations are predominantly held by white women, regardless of their marital status. However, only single black women are concentrated in clerical and sales occupations (see Table 1.5). Substantial proportions of both black and white female heads of families were separated or divorced. However, separated or divorced women were more prevalent among black heads of families (see Table 1.6).

Plan of Study

The main thrust of this thesis is to examine the theories of the economics of discrimination and to develop a modest econometric model that will analyze statistically the general hypothesis that there is an income differential between black and white females in the United States work force. Except as it concerns evidence necessary for evaluating these theories this thesis is not concerned with the empirical research on this subject.

The outline of the thesis is as follows: Chapter 2 contains a survey of the literature giving particular attention to the works of Gary Becker

and other neoclassical economists. Chapter 3 focuses on the development of the econometric model, the collection of data, and tests on the model. Chapter 4 contains the summary with policy implications with respect to the elimination of income differentials between black and white females.

Table 1.1

Median Income of Female Year-Round Full-Time Workers, by Age, 1969

Age	Number with income (thousands)		Median income, 1969 (dollars)		Ratio, black to white median income
	Negro	White	Negro	White	
Total	1,718	13,541	4,126	5,182	80
14 to 19 years	24	333	(a)	3,423	(a)
20 to 24 years	217	1,996	3,926	4,714	83
25 to 34 years	452	2,294	4,439	5,496	81
35 to 44 years	450	2,644	4,556	5,314	86
45 to 54 years	359	3,452	3,818	5,423	70
55 to 64 years	192	2,386	3,701	5,283	70
65 years and over	24	436	(a)	4,841	(a)

(a) Base less than 75,000

Source: The United States Department of Commerce, The Social and Economic Status of Negroes In The United States, 1970, BLS Report No. 394: Current Population Reports, Series P-23, No. 38.

Table 1.2

Median Income of Women 25 Years Old and Over, by Educational Attainment, 1969

Years of school completed	Women 25 years and over, 1970 (thousands)		Median Income, 1969 (dollars)	
	Negro	White	Negro	White
Total, 25 years and over	4,397	33,402	2,078	2,513
Elementary: Less than 8 years	1,261	4,028	1,195	1,303
8 years	496	4,447	1,320	1,688
High School: 1 to 3 years	1,075	5,562	2,268	2,355
4 years	1,054	12,673	3,257	3,234
College: 1 to 3 years	285	3,395	4,247	3,427
4 years or more	226	3,296	6,747	5,707
Increase in median income: College 4 years or more over elementary 8 years	N.A.	N.A.	5,427	4,019
College 4 years or more over high school 4 years	N.A.	N.A.	3,485	2,473

N.A. - not applicable

Source: The United States Department of Commerce, The Social and Economic Status of Negroes In The United States, 1970, BLS Report No. 394: Current Population Reports, Series P-23, No. 38.

Table 1.3

Families by Low Income Status, and Sex,
and Work Experience of Head, 1969

Subject	All families, 1970		Work status of head in 1969			
			Head worked		Head worked full-time	
	Negro	White	Negro	White	Negro	White
Male head:						
Total (thousands)	3,425	41,836	2,996	36,476	2,203	29,265
Percent below the low income level (a) . .	18	6	14	4	9	2
Female head:						
Total (thousands)	1,349	4,186	825	2,467	366	1,360
Percent below the low income level (a) . .	53	25	43	17	24	4

(a) The low income level is sometimes referred to as the poverty level. The poverty level, classifies families as being above or below the low income level, using cutoffs adjusted to the account of such factors as family size, sex and age of the family head, the number of children, and farm-nonfarm residence. The low income cutoffs for farm families have been set at 85 percent of the nonfarm levels. The low income threshold for a nonfarm family of four was $3,968 in 1960, $3,743 in 1969, and $2,973 in 1959. In 1970, the low income threshold ranged from about $2,500 for a family of two persons to $6,400 for a family with 7 or more persons.

Source: The United States Department of Commerce, The Social and Economic Status of Negroes In The United States, 1970, BLS Report No. 394: Current Population Reports, Series P-23, No. 38.

Table 1.4

Labor Force Status of Women 15 to 49 Years Old, by Age of Women and Presence of Young Children, 1969

Age and Race	Percent in labor force			
	Single Women	Women ever married		
		Total	With own children under 5 yrs. old	Without own children under 5 yrs. old
Negro and Other minority groups				
15 to 49 years . . .	40	56	44	63
15 to 24 years . . .	35	50	47	56
25 to 29 years . . .	65	55	47	66
30 to 49 years . . .	62	57	39	63
White				
15 to 49 years . . .	48	45	27	54
15 to 24 years . . .	43	47	32	68
25 to 29 years . . .	86	37	26	57
30 to 39 years . . .	80	41	24	51
40 to 49 years . . .	74	51	25	53

Source: The United States Department of Commerce, The Social and Economic Status of Negroes In The United States, 1970, BLS Report No. 394: Current Population Reports, Series P-23, No. 38.

Table 1.5

Distribution by Major Occupation of Employed Women by Marital Status and Race, 1970

Occupation	Single		Married husband present		Other marital status	
	Negro	White	Negro	White	Negro	White
Professional, technical and managerial . . .	13	22	16	21	8	18
Clerical and sales . .	39	49	21	44	16	38
Craftsmen and operatives	13	9	18	17	19	18
Farmers/farm laborers	(a)	(a)	1	2	1	2
Service workers . . .	25	13	28	15	30	19
Private household workers and laborers	11	8	17	2	28	6

(a) Represents zero

Source: The United States Department of Commerce, The Social and Economic Status of Negroes in the United States, 1970, BLS Report No. 394: Current Population Reports, Series P-23, No. 38.

Table 1.6

Marital Status of Female Heads
of Families, 1970

Marital Status	Negro	White
Total, female heads (thousands)	1,349	4,186
Percent, total	100	100
Single (never married)	16	9
Separated or divorced	48	37
Separated	34	11
Divorced	14	25
Married, husband absent . . .	6	7
In armed forces	2	3
Other reasons	4	5
Widowed	30	47

Source: The United States Department of Commerce
The Social and Economic Status of Negroes
In The United States, 1970, BLS Report
No. 394: Current Population Reports,
Series P-23, No. 38.

FOOTNOTES

Chapter 1 - The Introduction

1. J. R. Lyle and J. L. Ross. Women in Industry. Lexington, Massachusetts: D. C. Heath - Lexington Books, 1973.

2. J. F. Madden. The Economics of Sex Discrimination. Lexington, Massachusetts: D. C. Heath - Lexington Books, 1973.

3. L. C. Thurow. "The Economics of Poverty and Racial Discrimination". Economic Topic Series, Joint Council of Education, 1972.

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CHAPTER 2

SURVEY OF THE LITERATURE

The purpose of this chapter is to examine the theories of the economics of discrimination. It will concern itself with the empirical research on this subject. Should the reader find it necessary to have information regarding empirical studies in this area see Dale L. Hiestand, Discrimination In Employment: An Appraisal Of The Research. (12, 1970). Although some aspects of the economics of discrimination probably are applicable to discrimination between the sexes and other forms of discrimination, the emphasis of this chapter will be on racial discrimination.

The Neoclassical Model

The first statement of the neoclassical model of discrimination was by F. Y. Edgeworth in 1922 (9, 1922 pp. 431-457), but most of the work in the United States follows Gary S. Becker's The Economics of Discrimination (5, 1971). Many economists have elaborated on the Becker analysis, but the most complete statement of the neoclassical model was formulated by Kenneth Arrow's (3, 1972; 4, 1974) "Models of Job Discrimination" and "Some Models of Race In The Labor Market."

The Becker Model

Becker states that, "If an individual has a 'taste for discrimination', he must act as if he were willing to pay something, either directly or in the form of reduced income, to be associated with some persons instead of others". (5, 1971 p. 14) Becker makes the usual assumptions of the

neoclassical wage theory, namely perfect competition, homogeneous factors of production, and fixed institutional arrangements.

Becker defines a coefficient of discrimination to measure this "taste for discrimination" in money terms for different factors of production, employers, and consumers, where it is assumed that the factors of production are equally productive. If an employer faces a money wage rate of W for workers, then $W(1+d_i)$* defines a net wage rate, where d_i is the discrimination coefficient against this factor. (16, 1974) If the employer has a preference for this factor, d_i will be positive; if he has a taste for discrimination against it, it will be negative.

The market discrimination coefficient (MDC) is defined as $MDC=\frac{W_w-W_b}{W_b}$, where W_w is the equilibrium wage rate of white workers and W_b is the equilibrium wage rate for black workers.

An employee offered a wage rate of W_j for working with the factor discriminated against acts as if the net wage rate were $W_j(1-d_j)$, where d_j is his discrimination coefficient against this factor. A consumer, faced with a money price of P for the commodity produced by this factor, acts as if the net price were $P(1+d_k)$, where d_k is the discrimination coefficient against this factor. Most neoclassical economists assumed that the model is applicable to sex and other forms of market discrimination as well as race.

The obvious implication of the discrimination coefficient is that the employer is willing to pay the favored workers $(W+d_i)$ and the ones discriminated against $(W-d_i)$, so that if W_w is the wage rate of white

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*Notation is that of Ray Marshall, "The Economics of Racial Discrimination: A Survey", Journal of Economic Literature, September, 1974, Vol. 12.

workers and W_b the wage rate of black workers and employers prefer whites to blacks then $W_w > W_b$.

Becker utilizes an international trade model to illustrate the effects of discrimination on trade between two sectors; sector w and b. He assumes perfect competition and, relative to labor power, that whites own more capital than blacks. Therefore $\frac{C_w}{L_w} > \frac{C_b}{L_b}$, where C_w=white capital, C_b=black capital, L_w=white labor and L_b=black labor. Becker further assumes identical linear homogeneous production functions and perfect mobility of capital and labor between sectors. It, therefore, follows that before trade, (1) $MPL_b < MPL_w$ and (2) $MPC_w < MPC_b$, where MPL_b and MPL_w are the marginal productivities of labor in b and w sectors, respectively, and MPC_w and MPC_b are the marginal productivities of capital in w and b respectively.

Thus, before trade, w capitalists could get a higher return in b and b laborers could get a higher return in w. Whites will export C_x, the amount of capital exported that will achieve equilibrium between sectors, so that (3) $\frac{C_b+C_x}{L_b} = \frac{C_w-C_x}{L_w} = \frac{C}{L_w}$ and the $MPC_w=MPC_b$ and the $MPL_w=MPL_b$. Stated simply the total returns per unit of labor and capital in both sectors are equal and maximized so that gains cannot be made by additional exports of capital.

Introducing discrimination into the model causes w capitalists to suffer "psychic costs" whenever their capital is not used in b, so that their net return is $MPC_b(1+d)$ --where d is a negative fraction representing the money value of the psychic costs. The discrimination coefficient reduces capital exports to a level below C_x.

Comparing this result with the competitive equilibrium without discrimination, the marginal productivity of b labor will decrease, the marginal productivity of b capital will increase, the marginal productivity of w capital will decrease, and the marginal productivity of w labor will increase. Because production is no longer efficient, the country as a whole loses when w capitalists discriminate. Moreover, b workers and w capitalists lose income, while w workers and b capitalists gain. Therefore, in Becker's model the coefficient of discrimination acts like a tariff and causes lower wages, less employment, or both depending on the elasticities of labor supplies.

Criticisms and Modifications of the Becker Model

With regard to the Becker model of international trade even if white capitalists discriminate against black labor such that $\frac{C_w}{L_w} > \frac{C_b}{L_b}$ yielding $MPP_{L_w} < MPP_{L_b}$ and should the black sector produce labor intensive goods and $W_b = W_w$, then by the Heckscher hypothesis one must build in a discrimination against products or wages will be equalized through free trade.

Ann Krueger extends the international trade model to find an optimum level of discrimination analogous to an optimum tariff. (15, 1963 pp. 481-86) Krueger also discusses ways by which exporting white capital to blacks might be curtailed even if white capitalists themselves have no personal tastes for discrimination. For example if white capitalists were interested in maximizing the incomes of all whites rather than maximizing their own income, the resulting welfare function would be similar to Becker's except that discrimination would take the form of maximizing real income for

whites rather than avoiding working with blacks. This concept departs from the usual neoclassical assumption of individual decision making processes and assumes that employers' racial interests might modify their profit motives.

Marcus Alexis extends the neoclassical analysis, especially the motivations based on race developed by Krueger, to deal with problems involved with Becker's assumption that whites are motivated by a desire to avoid associating with blacks. Becker's assumption makes it difficult to explain discrimination by capitalists who do not physically associate with blacks. Alexis states that envy, malice, or racial considerations may prompt discrimination in this form; it is assumed that, in addition to the factors discussed by the neoclassical utility function, white employers might be motivated by desire to increase the relative wages going to whites (2, 1973 pp. 301-302).

Alexis, employing a Becker type model, adds Y^1 to the employer's utility function, where Y^1 is the relative share of wage income received by white workers, so that "black wages will be depressed more (less) in the envy-malice model than in the aversion model". (2, 1973 p. 309)

The models developed by Krueger and Alexis seem more congruent with reality than the aversion model. However, these models contain no convincing explanation of why white employers should want to maximize white workers income or exhibit envy-malice toward blacks. Alexis recognizes that his model could be formulated in terms of benevolence toward white workers by white capitalists, which seems to be more probable than envy-malice, although, status is a more likely factor than envy-malice or benevolence in explaining white motives for discrimination.

Alexis's work is neoclassical in tradition, he recognizes some limitations of this approach, i.e., the assumption of flexible wages and perfect capital markets. Alexis believes a general equilibrium model to be useful in this regard. (16, 1974 p. 851) The works of Krueger and Alexis also depart from the usual neoclassical assumption that group behavior and race motives clearly are very powerful and tend to change alowly, although the assumption that employers are interested in maximizing the incomes of white workers seems incompatible with a reality where employers hire whites and blacks even though blacks do not necessarily receive lower wages than whites. (16, 1974 pp. 851-852)

Besides the difficulty of making the aversion model fit into reality, the Becker model has other limitations for those interested in using the theory of discrimination to explain reality. For example, a long-run implication of the model is that employers with no discrimination coefficients would hire blacks because $W_b < W_w$, forcing competitors to do the same, in which case, under long-run competitive equilibrium, the wages of minorities would equal the wages of whites in either integrated or segregated situations. Should $W_w - W_b > d_i$, where d_i is the money value of the discrimination coefficient, employers would hire only b's; if $W_w - W_b = d_i$, work forces would be integrated. The above implies that employers would change their work forces in response to changes in the wage rates.

Richard Freeman, an economists writing in the neoclassical tradition and attempting to modify the Becker model to make it conform to reality where racial wage differentials and employment patterns are perceived to to be stable, suggests that discriminating employers might survive because

of limited supplies of non-discriminating employers or workers with complementary skills. (11, 1973).

This argument is not a convincing one under long-run equilibrium. Under purely competitive assumptions, there need to exist only one non-discriminating employer who could drive all others out of business in the long-run. This statement assumes that the LRAC curve does not turn upward. Black employers would be assumed to be nondiscriminators against blacks and if the neoclassical model were correct (assuming black and white employers to be identical), black employers should be able to undercut discriminating white employers (16, 1974 p. 853). Similarly, it is not reasonable to assume that shortages of complementary skills would persist in the long-run. (16, 1974 p. 853).

Barbara Bergmann utilized a Becker-type model to show how discrimination can cause wage differentials between equally skilled occupations (6, 1970; 7, 1971 pp. 294-313). Bergmann assumes two occupations requiring equal skills, one menial (M) and the other prestigious (P). In M, $W_b=W_w$, but in P, there is a discrimination coefficient so that blacks are hired only if $W_w > W_b$. The marginal productivities of M and P depend on the labor supplies for M and P. Given that the occupations are segregated, they will remain that way as long as $W_w-W_b < d_i$. Should $W_w-W_b > d_i$, blacks enter P and the wages of blacks in M increases, while the wages of both whites and blacks decline in P. Equilibrium of wage rates occur when the wage rate of blacks in M equals the wage rate of blacks in P and $W_w-W_b=d_{ip}$, where d_{ip} is the money value of the discrimination coefficient against blacks in P. The marginal productivities and wages of blacks in menial occupations will be less because of discrimination, since the tendency

to restrict blacks to those occupations would cause the supplies of labor in them to be larger than they would have been in the absence of discrimination.

Bergmann's analysis suggests that discrimination can cause wage differentials between equally skilled occupations and that racial wage differentials may be maintained by occupational segregation rather than by overt wage discrimination. Bergmann's analysis is also useful in indicating that the discrimination coefficient differs among occupations because of status considerations. This is a more reasonable premise than assuming that discrimination is a taste or distaste for physical association.

Kenneth Arrow has developed one of the more complete statements of the neoclassical theory of discrimination (4, 1974). Arrow's main objective is to explain racial wage differentials not based on productivity. Arrow's model, like Becker's, makes all of the usual neoclassical assumptions of full employment, competition, and profit and utility maximization. He specifically "seeks to develop further Becker's models and to relate them more closely to the theory of general competitive equilibrium, though frequently by way of contrast rather than agreement." (4, 1974 p. 5).

Arrow's simplest case of employer discrimination occurs when the employer seeks to maximize the utility function $U(\pi,b,w)$, where profits are seen as trade-offs between the number of black workers (b) to white workers (w). Capital is given in the short-run, therefore output is $f(w+b)$. Profits are given by $\pi=f(w+b)-W_w W-W_b B$, where W_b and W_w are wages of blacks and whites respectively. Should an employer have a taste for discrimination, the marginal utility of b labor is negative (assuming employers are white) and the discrimination coefficient, d_b, is positive so that $MP_b-W_b+d_b$ and $MP_w=W_w+d_w$, where d_w is negative if the employer

has a preference for whites or zero if the employer has no racial preference. Therefore, $W_w - W_b = d_b - d_w > 0$ and equilibrium requires $W_w \quad W_b$.

If all firms have the same utility functions, they all would hire equal amounts of blacks and whites, and the allocation of labor would be efficient. The effect of discrimination is to redistribute income from black workers (b) to white workers (w) and employers. It is quite clear that white workers do not lose ($MP_w = W_w + d_w$) and probably gain. The exact effect on profits depends on the employer's utility function.

Since $MP_w = MP_b = MP_1$, profits are $\pi = f(L) - (MP_1)_L + d_w W + d_b B$ where $L = w + b$. Profits where there is no discrimination are $\pi_1 = f(L) - (MP_1)_L$, and the change in profits would be $\pi - \pi_1 = d_w W + d_b B$. If it is assumed, which Arrow thinks plausible, that employee satisfaction depends on the ratio of black (b) to white (w) workers, then $d_w W + d_b B = 0$ and employers neither gain nor lose by discrimination.

The Dual Labor Market Hypothesis

One approach which has specifically challenged the neoclassical model is the "dual labor market" hypothesis. Economists have long known that the labor market was "balkanized" or divided into noncompeting groups, but the dual labor market idea became more popular with scholars who were studying ghetto labor markets during the late 1960's and early 1970's. These analysts at first studied ghetto labor markets in detail and then started to reformulate some of the ideas of a segmented labor market developed by Clark Kerr, Lloyd Fisher, Charles Killingsworth, and others (13, 1953; 10, 1954; 14, 1968). Although it is still more an hypothesis than a theory it represents a specific alternative to the neoclassical system.

Michael Piore states the dual labor market hypothesis concisely:

> The basic hypothesis of the dual labor market was that the labor market is divided into two essentially distinct sectors, termed the primary and the secondary sectors. The former offers jobs with relatively high wages, good working conditions, chances of advancement, equity and due process in the administration of work rules and, above all, employment stability. Jobs in the secondary sector, by contrast, tend to be low paying, with poorer working conditions, little chance of advancement; a highly personalized relationship between workers and supervisors which leaves wide latitude for favoritism and is conducive to harsh and captricious work discipline; and with considerable instability in jobs and high turnover among the labor force. The hypothesis was designed to explain the problems of disadvantaged, particularly black workers in urban areas, which had previously been diagnosed as one of unemployment (18, 1972 p. 2).

Piore explains the separation of markets by a number of specific arguments, which he has refined and analyzed in some detail (17, 1970):

(1) Secondary markets are distinguished from primary markets by the behavior patterns, especially unstable employment, which they impose on the workers in those markets. Employers and workers adapt to unstable conditions, and labor market institutions contribute to the perpetuation of these conditions. Welfare, for example, contributes to segmentation by providing such limited support that workers are forced into the secondary market. Unions operate mainly in the primary market and therefore contribute to the perpetuation of better wages, hours, and job protection in that sector. Unions have more difficulty in the secondary sector because the workers have little power to win strikes. The Employment Security Service perpetuates secondary employment conditions by referring workers with the prescribed characteristics to secondary jobs. Workers tend to be barred from primary jobs not because of their lack of job skills but because they work intermittently and are not reliable.

(2) Discrimination perpetuates segmentation by restricting certain workers to secondary markets not because of their education and skills but because they have superficial characteristics resembling most workers in the secondary market. Peter Dueringer and Michael Piore emphasize that many workers in the secondary market have stable employment even though their jobs encourage instability (8, 1971).

(3) While technology influences the allocation of jobs between the primary and secondary sectors, many kinds of work can be performed in either sector and fall where they are because of historical decisions to locate them there.

(4) The behavioral traits of workers in the various labor markets are reinforced by class associations. Jobs in the various sectors tend to be filled by people from particular classes. Piore defines "mobility chains" through which people pass (17, 1970). Workers enter these chains from a limited and distinct number of points which have economic and social significance. Therefore, people in a given job will tend to be drawn from a limited range of schools, neighborhoods, and types of family backgrounds; and conversely, people leaving the same school or neighborhood will move into a limited set of employment possibilities.

(5) A number of institutions and historical forces strengthen labor market segmentation. The importance of on-the-job training as a means of acquiring skills has increased the employer's incentive to hold some workers in more stable jobs, whereas other institutions have perpetuated instability. Migration of disadvantaged workers into urban areas perpetuates a supply of workers in the secondary markets.

Criticisms of the Dual Labor Market Hypothesis

The dual labor market approach deals with discrimination mainly as a factor in labor market segmentation, with no special theory of discrimination. Because of discrimination, blacks have a high probability of being restricted to secondary labor markets. Moreover, once they get into these markets, the adaptive forces at work in that sector make it difficult for blacks to move into primary markets.

The dual labor market analysis is still in its formative stage and therefore, scarcely qualifies as a "theory". Thus far, it is a classification system more than a theory. Moreover, the analysis and description apply only to parts of the economy and are not, therefore, a complete system. Many labor markets, such as those for craftsmen and independent professional and technical workers, do not fit neatly into that system. Moreover, the origin and causes of labor market segmentation are not satisfactorily formulated.

FOOTNOTES

Chapter 2 - Survey of the Literature

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CHAPTER 3

THE EFFECTS OF PRODUCTIVITY VARIABLES AND LABOR MARKET DISCRIMINATION ON THE RELATIVE EARNINGS OF BLACK FEMALES

In 1960 the median earnings of black females was $1146.05 (see Table 3.6) compared to $1489.32 for white females (see Table 3.6); in 1970 the median earnings of black females was $2217.72 (see Table 3.12) compared to $2430.07 for white females (see Table 3.12). In 1960 this means that black females earned approximately 77 percent of what white females earned and in 1970 black females earned approximately 91 percent of what white females earned. Statistics such as these have been the cause of much concern during the past decade. During the Kennedy and Johnson administrations, for instance, major efforts to reduce labor market discrimination and to improve the educational opportunities of blacks and other minorities were undertaken.

This chapter investigates the causes of the earnings gap that existed between black and white females in 1960 and in 1970 and estimates how much of these differentials can be attributed to (1) differences in education and other variables related to labor market productivity, and (2) how much is assignable to labor market discrimination. Other studies that have dealt with the issue of income differentials include Duncan (2, 1968), Gwartney (4, 1970), Weiss (6, 1970), and Fogel (3, 1966).

The Conceptual Framework

Separate earnings functions are estimated for black and white females. This technique is identical to one as employed by Masters.

(5, 1974). Assume that these earnings functions are perfectly specified, that is, given a set of values for the independent variables, an individual's earnings can be predicted with perfect accuracy. Labor market discrimination can be defined as the difference between average black and white earnings that would exist if blacks and whites had the same average values for all independent variables.

Operationally, the estimate of the effect of labor market discrimination is derived by substituting the mean black values for the independent variables into the white earnings function. Let this result be represented by $f_w(EBL)$ and let the actual mean earnings of blacks be represented by (EBL). Then, if the earnings function were perfectly specified, $f_w(EBL)-(EBL)$ would represent the effect of labor market discrimination against blacks. See Bergmann (1, 1971) for some results supporting this general view.

The effect of differences in all of the independent variables are estimated by substituting the average white values for these variables into the black earnings function and calculating $f_b(EWH)-(EBL)$. Note that this effect plus the effect of labor market discrimination may not sum to the total racial earnings gap, therefore $f_w(EBL)-(EBL) + f(EWH)-(EBL)$ may not equal $(EWH)-(EBL)$. If labor market discrimination were eliminated and if blacks were also given the white values for education and the other independent variables affecting productivity and labor market conditions the total might be greater (less) than the individual effects since blacks with above average education may face greater (less) discrimination in the labor market.

Sample Data and Variables

Before estimating earnings functions for black and white females based on the data contained in the 1960 Census of Population it is necessary to test for a significant difference in their incomes. The results of the tests are presented in Table 3.1.

These results are based upon aggregate data representing a sample of female earnings in twenty traditionally southern and twenty non-southern SMSA's. The females included in the sample range in age from 14 to 65. Those females under age 14 and over age 65 are excluded because, among other things, their number in the working force is very small.

The dependent variable is the natural log of annual earnings. The natural log of annual earnings is employed because it gives a better "fit" for the regression equations and because most manpower economists use this technique. The primary independent variables are median education and work experience. Median education is denoted by EDBL and EDWL for black and white females, respectively. Work experience is denoted by EXPBL for black females and is defined as median age minus five (AGBL-5); work experience for white females is denoted by EXPWH and is defined as median age minus five (AGWH-5). The constant 5 is subtracted from median age because most individuals enter school at age six.

In addition to these independent variables the use of a dummy variable for geographic region seems appropriate. The dummy variable is denoted by DUM. Those black females living in the non-southern SMSA's receive a value of 1 and those living in the traditionally southern SMSA's receive a value of 0. The dummy variable is employed to see if black females living in the traditionally southern SMSA's are

experiencing discrimination in the labor market. The dummy variable will "pick up" a constant difference in salaries between southern and non-southern regions, thereby accounting for absolute differences in salaries between the two regions.

Table 3.4 reflects the mean values of the variables, their variances, standard deviations, and coefficient of variations. Table 3.5 shows that portion of the earnings gap that can be attributed to labor market discrimination and to differences in productivity variables.

The portion of the earnings gap attributable to labor market discrimination may be found by employing the following formula:

$$MD = \frac{\text{Actual earnings of black females} - \text{Predicted earnings of black females}}{\text{Actual earnings of black females}}$$

The portion of the earnings gap attributable to differences in productivity may be found by employing the following formula:

$$PD = \frac{\text{White female mean earnings} - \text{Black female predicted earnings}}{\text{White female mean earnings}}$$

In both instances black female predicted earnings are obtained by substituting the mean black values for the independent variables into the white female earnings function.

The results thus far suggest that (1) statistically there is a difference in the earnings of black and white females living in the southern SMSA's, the non-southern SMSA's, and in the United States (achieved by combining southern and non-southern SMSA's)(2) black females living in the southern SMSA's face some form of labor market discrimination relative to white females living in the same region (3) a small change in either median education or work experience will

significantly change the earnings of black females (4) that most of the difference in earnings may be attributed to productivity and not to labor market discrimination.

With respect to #4, the analysis suggests that given the predicted earnings of black females using the white females earnings function, and, given the acutal earnings of white females, white females are discriminated against in the labor market; using 1960 data this reverse discrimination amounted to approximately 2%. This finding is contrary to popular belief and should be set forth with some reservations.

Table 3.1

Test for Differences Between Incomes of Black and White Females for the Year of 1960

$$t = \frac{(M_1 - M_2) - d_0}{\text{estimated } \sigma \text{ difference}} = \frac{(M_1 - M_2) - d_0, \text{ where } d_0 = 0}{\sqrt{\frac{N_1 S_1^2 + N_2 S_2^2}{N_1 + N_2 - 2} \quad \frac{N_1 + N_2}{N_1 N_2}}}$$

Region	White Female Earnings	Black Female Earnings	T Statistic
Southern SMSA's	1411.80	937.25	4.31*
Non-Southern SMSA's	1566.85	1354.85	2.01*
United States	1489.32	1146.05	4.16

*Significant at .05 level

Table 3.2

Earnings Functions for Black
Females for the Year 1960

The earnings function of black females is specified as:

$$\text{Log } E_{bl} = \text{Log Constant}(C) + \text{Log EDBL} + \text{Log EXPBL} + \text{Log DUM}.$$

Independent Variable	Estimated Coefficient	Standard Error	T Statistic
Constant	5.422	.52551	10.318
EDBL	.1234	.05253	2.349*
EXPBL	.0257	.01236	2.079*
DUM	.2146	.11601	1.849*

R-Squared=.4915

*Significant at .05 level

Table 3.3

Earnings Functions for White
Females for the Year 1960

The earnings function of white females is specified as:

Log EWH=Log Constant (C)+Log EDWH+Log EXPWH+Log DUM.

Independent Variable	Estimated Coefficient	Standard Error	T Statistic
Constant	5.4628	.72828	7.501
EDWH	.1246	.05864	2.125*
EXPWH	.0291	.01430	2.032*
DUM	.0315	.08435	.3732

R-Squared=.1969

*Significant at .05 level

Table 3.4

Summary Values for the Independent Variables for the Year of 1960

VARIABLE	MEAN	VARIANCE	STANDARD DEVIATION	COEFFICIENT OF VARIATION
EDWH	11.0075	.5479	.7402	.0672
EDBL	9.8175	1.3466	1.1604	.1182
EXPWH	14.5900	8.8459	2.9742	.2039
EXPBL	9.9849	10.8864	3.2995	.3304

Table 3.5

Earnings Gap Attributable to Labor Market Discrimination and to Differences in Productivity for the Year 1960

VARIABLE		BLACK MEAN VALUE	PREDICTED VALUE
CONSTANT	-1136.46		-1136.46
EDWH	184.51	9.82	1811.89
EXPWH	39.58	10.89	431.03
DUM	34.40	0.50	17.20
PREDICTED EARNINGS OF BLACKS			1123.66
ACTUAL EARNINGS OF BLACKS			1146.05
ACTUAL EARNINGS OF WHITES			1489.32

Labor Market Discrimination= $\frac{1146.05-1123.66}{1146.05}$ -2%

Productivity Differences= $\frac{1489.32-1123.66}{1489.32}$ +24.55%

Table 3.6

Median Incomes of Black and White
Females for the Year of 1960

RACE	MEAN	VARIANCE	STANDARD DEVIATION	COEFFICIENT OF VARIATION
BLACK	1146.05	134313.	366.487	.2461
WHITE	1489.32	131437.	362.542	.3163

Empirical Results from the 1970 Census of Population

The earnings functions for both black and white females estimated on the basis of 1970 data are presented in Tables 3.8 and 3.9. The results are quite different from those obtained using 1960 data. Median education and work experience are not significant variables in predicting income for black or white females, whereas in 1960 both of these variables were significant at the .05 level. The constant terms is not of as much importance in 1970 and it was in 1960; in both instances (1960) the constant term was significant and positive, but only in one instance in 1970 is the constant term almost significant and positive, and that occurs in the earnings function of black females. The dummy variable for the white female earnings function is not significant, indicating, as in 1960, that geographic region has little influence upon annual earnings. On the other hand, the dummy variable for the black female earnings function is positive and significant at the .01 level, indicating that those black females who reside in the twenty southern SMSA's experienced relatively more labor market discrimination in 1970 than they did in 1960.

Table 3.7 indicates the test for differences in income for black and white females; Table 3.10 summarizes the values for the independent variables; Table 3.11 shows those portions of the earnings gap attributable to labor market discrimination and to differences in productivity, and Table 3.12 reveals the median income of black and white females.

The results suggest that (1) statistically there is a difference between the earnings of black and white females living in the southern and combined SMSA's (the United States) but, that there is little difference between the earnings of white and black females living in the

non-southern SMSA's (2) black females living in the southern SMSA's face more labor market discrimination in 1970 than they did in 1960 (3) median education and work experience are no longer important (significant) variables in explaining annual earnings of black or white females (4) that most of the difference in earnings may be attributed to productivity and not to labor market discrimination.

With respect to #4, the analysis suggests, as it did using 1960 data, that white females faced reversed discrimination of approximately 3% in 1970; an increase of 1% since 1960. Again, this finding should be considered as surprising and contrary to real life situations.

Table 3.7

Test for Differences Between Incomes of Black and White Females for the Year of 1970

$$t = \frac{(M_1 - M_2) - d_0}{\text{estimated 6 difference}} = \frac{(M_1 - M_2) - d_0, \text{ where } d_0 = 0}{\sqrt{\frac{N_1 S_1^2 + N_2 S_2^2}{N_1 + N_2 - 2} \quad \frac{N_1 + N_2}{N_1 N_2}}}$$

Region	White Female Earnings	Black Female Earnings	T Statistics
Southern SMSA's	2442.85	1926.20	3.13*
Non-Southern SMSA's	2417.30	2509.25	-.5508
United States	2430.07	2217.72	1.71*

*Significant at .05 level

Table 3.8

Earnings Functions for Black Females for the Year 1970

The earnings function of black females is specified as:

Log EBL=Log Constant (C)+Log EDBL+Log EXPBL+Log DUM.

Independent Variable	Estimated Coefficient	Standard Error	T Statistic
Constant	4.7992	2.97167	1.6149*
EDBL	.2299	.24474	.9394
EXPBL	.0083	.01597	-.5226
DUM	.2253	.08880	2.536**

R-Squared=.2776

*Significant at .05 level
**Significant at .01 level

Table 3.9

Earnings Function for White
Females for the Year 1970

The earnings function of white females is specified as:

Log EWH=Log Constant (C)+Log EDWH+Log EXPWH+Log DUM.

Independent Variable	Estimated Coefficient	Standard Error	T Statistic
Constant	5.2556	4.03857	1.301
EDWH	.1916	.32328	.5925
EXPWH	.0127	.00994	1.274
DUM	.0256	.065734	-.3907

R-Squared=.0554

Table 3.10

Summary Values for the Independent Variables for the Year of 1970

VARIABLE	MEAN	VARIANCE	STANDARD DEVIATION	COEFFICIENT OF VARIATION
EDWH	12.4275	.0112	.1062	.0085
EDBL	12.2300	.0334	.1828	.0149
EXPWH	12.2800	9.97135	3.1577	.2571
EXPBL	6.7175	5.96403	2.4421	.3635

Table 3.11

Earnings Gap Attributable to Labor Market Discrimination and to Differences in Productivity for the Year 1970

VARIABLE		BLACK MEAN VALUE	PREDICTED VALUE
CONSTANT	-5922.98		-5922.98
EDWH	647.63	12.23	7920.51
EXPWH	28.11	6.72	188.90
DUM	-81.16	0.50	-40.58

PREDICTED EARNINGS OF BLACKS 2145.85

ACTUAL EARNINGS OF BLACKS 2217.72

ACTUAL EARNINGS OF WHITES 2430.07

Labor Market Discrimination= $\frac{2217.72-2145.85}{2217.72}$ -3%

Productivity Differences= $\frac{2430.07-2145.85}{2430.07}$ +11.69%

Table 3.12

Median Incomes of Black and White
Females for the Year of 1970

RACE	MEAN	VARIANCE	STANDARD DEVIATION	COEFFICIENT OF VARIATION
BLACK	2217.72	390570.	624.956	.2818
WHITE	2430.07	207373.	455.382	.1874

Productivity Variables and The Earnings Gap

Earlier the analysis of the earnings gap between white and black females suggested that most of the income differential could be explained by differences in productivity rather than by labor market discrimination.

The productivity variables necessary to examine this differential are: 1) median education difference of black and white females (MEDDIFF); 2) labor force participation rate of black females (LFPR); 3) black male unemployment rate (BLMLUE); 4) percentage of blacks in the total population (PERBLPOP); 5) the square of the percentage of the blacks in the total population (SPERBLPOP); and 6) the total unemployment rate (TUER). Median education difference of black and white females may be viewed primarily as a productivity variable, whereas the other variables may be considered supply variables.

The effect that median education difference has on the earnings differential is likely to be exaggerated because unlike the case of males, females who graduate from high school and college enter the labor market. Generally speaking, highly educated white females tend to marry males who are employed in higher productivity areas, and therefore, higher paying jobs. The result is that they may not enter the labor market.

The labor force participation rate of black females and the black male unemployment rate are important variables. A priori reasoning would indicate that black males are discriminated against or underemployed by the labor market necessitating the entry of a relatively larger number of black females into the labor market willing to accept a lower than average wage rate. Thus the effect of forcing the black female into the labor market will tend to widen the earnings gap.

The percentage of blacks in the total population and the accompanying square term are important because they allow examination of the "cultural dominance" hypothesis. The cultural dominance hypothesis suggests that discrimination against blacks is negligible where blacks make up a small portion of the population, that it increases as the percentage of blacks in the population increases, and that it declines when blacks obtain a large majority.

The total unemployment rate allows examination of what effect unemployment in all sectors of the economy has on the earnings gap. That is, will increases (decreases) in the total unemployment rate increase (decrease) the earnings gap?

Methodology

Separate regressions are estimated for the southern, non-southern, and combined SMSA's for both 1960 and 1970. This allows examination for differences in earnings between the geographic regions during a period in time and through time. Because of possible multicollinearity among some of the independent variables, regressions using a combination(s) of the variables are utilized. These regressions serve the purpose of focusing on the relative importance of the variables in explaining the earnings differential. Not all of the regressions are presented or discussed. The most important equations are found in the text.

Further Empirical Results From the 1960 and 1970 Census of Population

The statistical results are based on a sample of twenty traditionally southern and twenty non-southern SMSA's. The SMSA's employed are the same as those employed in the earlier analysis pertaining to

labor market discrimination. The dependent variable is the absolute difference between white female earnings and black female earnings; denoted $|Y_{wf}-Y_{bf}|$. The independent variables are those variables discussed earlier in this section. The results of the regression analysis are presented in Tables 3.13 thru 3.18, with the t values placed below the appropriate coefficient. The 1960 results are presented first in the following order 1) southern SMSA's 2) non-southern SMSA's and 3) combined SMSA's. The results for 1970 are presented in the same order.

Given that X_2=MEDDIFF; X_3=LFPR; X_4=BLMLUE; X_5=PERBLPOP; X_6=SPERBLPOP; X_7=TUER, the regressions presented in Tables 3.13 thru 3.18 reveal the importance of these independent variables in explaining the earnings differential that existed between white and black females for the years of 1960 and 1970. Tables 3.13 thur 3.15 reflect the use of 1960 data and Tables 3.16 thru 3.18 reflect the use of 1970 data.

Given that X_2=MEDDIFF; X_3=LFPR; X_4=BLMLUE; X_5=PERBLPOP; X_6=SPERBLPOP; X_7=TUER, the regressions presented in Tables 3.13 thru 3.18 reveal the importance of these independent variables in explaining the earnings differential that existed between white and black females for the years of 1960 and 1970. Tables 3.13 thur 3.15 reflect the use of 1960 data and Tables 3.16 thru 3.18 reflect the use of 1970 data.

Table 3.13

1960 Southern SMSA's

$$\left|Y_{wf}-Y_{bf}\right| = \underset{(-.77)}{-212.84} - \underset{(-2.16)*}{201.45X_2} + \underset{(2.25)*}{14.26X_3} + \underset{(1.98)*}{31.03X_5} - \underset{(-1.74)*}{.43X_6}$$

$R^2 = .39 \qquad F = 2.44$

$$\left|Y_{wf}-Y_{bf}\right| = \underset{(-1.97)*}{-743.96} - \underset{(-1.15)}{112.38X_2} + \underset{(2.95)**}{18.28X_3} + \underset{(1.90)*}{49.07X_4} + \underset{(1.03)}{16.75X_5} - \underset{(-.78)}{.20X_6}$$

$R^2 = .52 \qquad F = 3.01$

$$\left|Y_{wf}-Y_{bf}\right| = \underset{(-1.39)}{-649.25} - \underset{(-1.16)}{118.45X_2} + \underset{(2.73)**}{17.85X_3} + \underset{(1.81)}{54.23X_4} + \underset{(.81)}{14.39X_5} + \underset{(-.62)}{.17X_6} - \underset{(-.38)}{13.50X_7}$$

$R^2 = .52 \qquad F = 2.38$

*Significant at .05 level
**Significant at .01 level

Table 3.14

1960 Non-Southern SMSA's

$$\left|Y_{wf}-Y_{bf}\right| = \underset{(.76)}{107.43} + \underset{(.91)}{47.93X_2} - \underset{(-.15)}{.42X_3} + \underset{(1.98)*}{22.68X_5} - \underset{(-1.56)}{.54X_6}$$

$R^2 = .32 \qquad F = 1.78$

$$\left|Y_{wf}-Y_{bf}\right| = \underset{(.65)}{142.03} + \underset{(.84)}{46.27X_2} - \underset{(-.24)}{.81X_3} - \underset{(-.21)}{1.76X_4} + \underset{(1.91)*}{23.27X_5} - \underset{(-1.49)}{.56X_6}$$

$R^2 = .32 \qquad F = 1.34$

$$\left|Y_{wf}-Y_{bf}\right| = \underset{(.02)}{7.22} + \underset{(.74)}{41.50X_2} + \underset{(.03)}{.12X_3} - \underset{(-.29)}{2.48X_4} + \underset{(1.77)*}{22.11X_5} - \underset{(-1.38)}{.53X_6} + \underset{(.73)}{21.04X_7}$$

$R^2 = .35 \qquad F = 1.17$

*Significant at .05 level

Table 3.15

1960 Combined SMSA's

$$\left| Y_{wf}-Y_{bf} \right| = \underset{(.19)}{27.76} + \underset{(1.12)}{43.02X_2} + \underset{(.67)}{1.90X_3} + \underset{(2.37)*}{18.03X_5} - \underset{(-1.69)*}{.26X_6}$$

$R^2 = .37 \qquad F = 5.05$

$$\left| Y_{wf}-Y_{bf} \right| = \underset{(-.54)}{-108.35} + \underset{(1.18)}{45.72X_2} + \underset{(1.02)}{3.25X_3} + \underset{(.93)}{7.70X_4} + \underset{(2.38)*}{18.13X_5} - \underset{(-1.64)*}{.25X_6}$$

$R^2 = .38 \qquad F = 4.19$

$$\left| Y_{wf}-Y_{bf} \right| = \underset{(-1.27)}{-323.08} + \underset{(1.30)}{49.55X_2} + \underset{(1.46)}{4.91X_3} + \underset{(.78)}{6.41X_4} + \underset{(2.35)*}{17.72X_5} - \underset{(-1.46)}{.22X_6} + \underset{(1.35)}{28.59X_7}$$

$R^2 = .41 \qquad F = 3.89$

*Significant at .05 level

Table 3.16

1970 Southern SMSA's

$$\left| Y_{wf}-Y_{bf} \right| = \underset{(.003)}{3.44} + \underset{(.56)}{401.63X_2} + \underset{(.31)}{5.65X_3} + \underset{(.62)}{12.30X_5} - \underset{(-.83)}{.21X_6}$$

$R^2 = .10 \qquad F = .42$

$$\left| Y_{wf}-Y_{bf} \right| = \underset{(.36)}{552.54} + \underset{(.64)}{477.84X_2} - \underset{(-.07)}{1.61X_3} - \underset{(-.48)}{42.29X_4} - \underset{(.64)}{13.08X_5} - \underset{(-.83)}{.22X_6}$$

$R^2 = .11 \qquad F = .36$

$$\left| Y_{wf}-Y_{bf} \right| = \underset{(-.77)}{-2057.93} + \underset{(.02)}{18.98X_2} + \underset{(.90)}{35.49X_3} - \underset{(-.67)}{49.16X_4} + \underset{(1.22)}{30.42X_5} - \underset{(-1.37)}{.44X_6} + \underset{(1.19)}{235.19X_7}$$

$R^2 = .20 \qquad F = .55$

Table 3.17

1970 Non-Southern SMSA's

$$\left| Y_{wf}-Y_{bf} \right| = \underset{(.28)}{189.54} + \underset{(.67)}{681.30X_2} - \underset{(-.84)}{9.35X_3} + \underset{(.35)}{12.21X_5} - \underset{(-.30)}{.20X_6}$$

$R^2 = .16 \qquad F = .72$

$$\left| Y_{wf}-Y_{bf} \right| = \underset{(1.06)}{741.14} + \underset{(1.27)}{1216.92X_2} - \underset{(-1.26)}{13.33X_3} - \underset{(-1.84)*}{53.96X_4} + \underset{(.24)}{7.88X_5} - \underset{(-.28)}{.17X_6}$$

$R^2 = .33 \qquad F = 1.35$

$$\left| Y_{wf}-Y_{bf} \right| = \underset{(.78)}{835.29} + \underset{(1.19)}{1238.26X_2} - \underset{(-1.19)}{13.76X_3} - \underset{(-1.68)*}{52.99X_4} + \underset{(.20)}{7.07X_5} - \underset{(-.26)}{.17X_6} \underset{(-.12)}{-23.37X_7}$$

$R^2 = .33 \qquad F = 1.05$

*Significant at .05 level

Table 3.18

1970 Combined SMSA's

$$\left| Y_{wf}-Y_{bf} \right| = \underset{(.17)}{84.61} + \underset{(1.13)}{688.98}X_2 - \underset{(-.70)}{6.19}X_3 + \underset{(1.57)}{26.65}X_5 - \underset{(-1.39)}{.35}X_6$$

$R^2 = .24$ $F = 2.73$

$$\left| Y_{wf}-Y_{bf} \right| = \underset{(1.52)}{801.61} + \underset{(1.91)*}{1087.65}X_2 - \underset{(-1.43)}{11.76}X_3 - \underset{(-3.00)**}{68.75}X_4 + \underset{(1.31)}{20.17}X_5 - \underset{(-1.32)}{.30}X_6$$

$R^2 = .40$ $F = 4.49$

$$\left| Y_{wf}-Y_{bf} \right| = \underset{(.88)}{648.58} + \underset{(1.82)*}{1059.47}X_2 - \underset{(-1.18)}{10.67}X_3 - \underset{(-2.94)**}{70.65}X_4 + \underset{(1.32)}{21.43}X_5 - \underset{(-1.34)}{.31}X_6 + \underset{(.30)}{32.14}X_7$$

$R^2 = .40$ $F = 3.66$

Analysis of the Empirical Findings of the Productivity Variables

Given the variables employed in the regressions, several points of interest and importance should be presented. Therefore, under a separate sub-heading each variable and its behavior will be presented and discussed.

The Constant Term(C). A constant of zero implies that a zero value for all independent variables would totally eliminate wage differences. In the empirical analysis of the 1960 and 1970 data the constant term was both negative (six times) and positive (twelve times), but never was it significant at the .05 level. Given that the constant term was never significant implies that wage differences between black and white females can be explained totally by the independent variables.

Median Educational Differences (MEDDIFF). This variable should be the most important productivity variable. A priori reasoning would indicate this variable's coefficient to be positive; the variable works well in some cases (positive and significant) but not so well in other cases (negative and insignificant). The problem of who enters the labor market influences the sign and the significance level of MEDDIFF.

As an example of how the coefficient approaches zero, consider the following: As the percentage of highly educated white females increases, while the percentage of highly educated black females remains constant, MEDDIFF increases. Suppose now that as the percentage of the highly educated white females increases, less and less of them enter the labor market. The net result of the above assumptions are that average wage

differentials $\left|Y_{wf}-Y_{bf}\right|$, remain constant while MEDDIFF is increasing. This would give a zero slope coefficient for MEDDIFF.

A large value of MEDDIFF implies that (1) white females are more highly educated than their black counterparts and if (2) education does reflect wage differences, and if (3) an equiproportional level of all white females enter the labor market, then MEDDIFF should be large and positive.

If MEDDIFF is large and negative a perverse reaction is occurring; the assumption that an equiproportional level of all white females enter the labor market is not true. i.e. As the general level of white female education increases, less and less educated white females work, and the average wages of white females, Y_{wf}, decreases the net result is that wage differentials, $\left|Y_{wf}-Y_{bf}\right|$, decreases as MEDDIFF increases.

If the assumption that education does reflect wage differences is not true i.e. female discrimination in general with respect to wages exists, the result is that $\left|Y_{wf}-Y_{bf}\right|$ is constant and MEDDIFF is increasing; this too, would give a zero slope coefficient for MEDDIFF.

White females may not enter the labor market for two reasons: (1) those white females that graduated from high school and college tend to marry males of similar education and therefore, devote their energies to becoming home makers; (2) those white females that enter the labor market are the less educated whites and tend to compete directly with the black females for the same jobs or those educated white females that enter the labor force do so as secondary wage earners securing only part-time employment at relatively low wages.

If either of these possibilities is realized then education will not be an important determinant of female earnings. This will tend to be reflected by both the sign and the significance level of the coefficient.

Labor Force Participation Rates of Black Females (LFPR). Assume that the demand for female labor is constant. Also assume that the supply of white female labor is constant, but the supply of black female labor is increasing (reflected by increases in the LFPR). If there were no discrimination between black and white female labor, an increase in the supply of female labor would decrease the wages of both black and white females and the dependent variable's value, $|Y_{wf}-Y_{bf}|$, would remain constant. If, however, a dual labor market is in operation, only black female wages would fall. Therefore, theoretically an increase in LFPR would result in an increase in the dependent variable's value, or stated alternatively the coefficient for LFPR would become positive and significant.

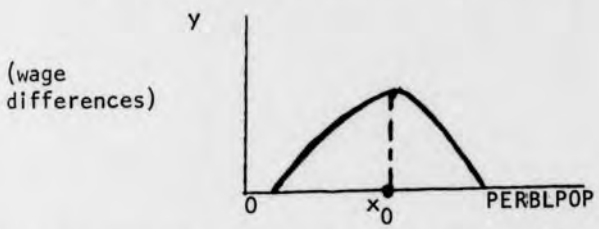
The data for the 1960 Census of Population for the southern SMSA's supports this statement. LFPR was both positive and significant in all three equations (see Table 3.13) whereas in 1970, LFPR was insignificant on all occasions and on one occasion negative (see Table 3.16). These results indicate that the dual labor market has been "shattered", or stated alternatively, the results ask the question: "Has the dual labor market been 'shattered', if it ever existed?"

Percentage of Blacks in the Population and the Accompanying Square Term (PERBLPOP and SPERBLPOP). The percentage of blacks in the population and its accompanying square term allow examination of the idea of "cultural dominance". Given the equations as presented in Table 3.19 the maximum

level of discrimination against blacks may be computed by using the following formula: (1) $Y=a+bx-cx^2$. Differentiating this formula to the first degree it becomes (2) $dy/dx=b-2cx=0$, or(3) $x=b/2c$. The formula essentially answers the question, "For what value of x is y maximized, where y is the dependent variable of wage differences and x is the percentage of blacks in the population.

In both the 1960 and 1970 equations MEDDIFF was eliminated because in each instance it proved to be insignificant, therefore, it can be assumed to be of minimal consequence. Using the 1960 equation discrimination is maximized when blacks constitute 38 percent of the population; in 1970 discrimination is maximized when blacks constitute approximately 36 percent of the population.

Graphically the results may be shown as follows:



The distance from 0 to x_0 represents the "zone of increasing discrimination".

If this "zone" is a measure of labor supply, as the percentage of blacks increase the supply curve of blacks should shift outward and if the dual labor market exists, the wages of blacks should fall. If this does not happen, discrimination is due to non-market considerations. If the dual labor market does not exist then 1) white salaries should fall and/or 2) whites may be moving out of the SMSA after the population surpasses 40 percent black and the dual labor hypothesis collapses.

Table 3.19

1960 and 1970 Combined SMSA's -
Emphasis on Cultural Dominance
(The 1960 Equation is Presented First)

$$\left|Y_{wf}-Y_{bf}\right| = 111.157 + \underset{(1.77)^*}{17.32X_5} - \underset{(1.63)}{.24X_6}$$

$$R^2 = .36 \qquad F = 6.68$$

$$\left|Y_{wf}-Y_{bf}\right| = -261.136 + \underset{(2.14)^*}{32.06X_5} - \underset{(-1.83)^*}{.42X_6}$$

$$R^2 = .23 \qquad F = 3.53$$

*Significant at .05 level

Black Male Unemployment Rate (BLMLUE). If the value of the coefficient is positive what does this indicate? It might indicate that a high level of BLMLUE dictates an increase in LFPR with the net result being that black female wages must fall relative to white female wages, therefore, the value of the dependent variable, $|Y_{wf}-Y_{bf}|$, must increase. Table 3.13 supports this statement, because in 1960 within the southern SMSA's BLMLUE was both positive and significant at the .05 level. This in itself does not reflect discrimination against black females, it simply reflects labor supply conditions.

The Total Unemployment Rate (TUER). In no instance was this variable significant. On several occasions the sign of the coefficient changed from positive to negative, and vice versa, therefore, rendering its use in an analytical discussion useless.

FOOTNOTES

Chapter 3 - The Effects of Productivity Variables and Labor Market Discrimination on the Relative Earnings of Black Females

1. B. R. Bergmann. "The Effect on White Incomes of Discrimination in Employment". Journal of Political Economy, March/April 1971.

2. O. D. Duncan. "Inheritance of Poverty or Inheritance of Race?" On Understanding Poverty, ed. Daniel P. Moynihan, New York: Basic Books, 1968.

3. W. Fogel. "The Effect of Educational Attainment on Incomes". The Journal of Human Resources, Fall, 1966, Vol. 1, pp. 22-40.

4. J. D. Gwartney. "Discrimination and Income Differentials". American Economic Review, Vol. 60, June, 1970.

5. S. J. Masters. "The Effect of Educational Differences and Labor Market Discrimination on the Relative Earnings of Black Males". The Journal of Human Resources, Vol. 9, Summer, 1974, pp. 343-359.

6. R. Weiss. "The Effect of Education on the Earnings of Blacks and Whites". Review of Economics and Statistics, Vol. 52, May, 1970.

CHAPTER 4

SUMMARY AND CONCLUSIONS

Summary

The purpose of this thesis was to analyze statistically the general hypothesis that there exists an income differential between black and white females in the United States work force.

Chapter 1 focused on the problem of defining discrimination. After an appropriate discussion on the definition of discrimination most economists would agree that discrimination, or types of discrimination can be classified into one of the following categories: (1) employment discrimination, (2) wage discrimination, (3) occupational discrimination, (4) human capital discrimination, (5) capital discrimination, (6) racial discrimination, (7) sex discrimination, and/or (8) price discrimination. In addition to a discussion of the various types of discrimination, statistical data were presented with respect to median incomes of females, labor force status of women, distribution by major occupation of employed women by marital status and race, and marital status of female heads of families.

Chapter 2 examined the theories of the economics of discrimination. Gary Becker's model was given particular emphasis, because his work is considered by many economists as the most complete statement of the neo-classical model of the economics of discrimination. Chapter 2 also contains relevant summary discussions of the works of Ann Krueger, Marcus Alexis, Richard Freeman, Barbara Bergmann and Kenneth Arrow, all of whom modify the Becker model in their analysis of discrimination.

The works of Michael Piore and Peter Doeringer are also included in Chapter 2 because these economists are associated with the "dual labor market hypothesis". This hypothesis specifically challenges the neoclassical model developed by Becker. In essence, this chapter represented a review of the current literature on the economics of discrimination.

Chapter 3 contains the development of the econometric model and statistical tests related to the model. This chapter investigates closely the causes of the earnings gap that existed between black and white females in 1960 and 1970 and estimates how much of this income differential can be attributed to (1) differences in education and other variables related to labor--market productivity, and (2) how much is assignable to labor market discrimination.

Conclusions

The results suggest the following conclusions: (1) Statistically there is a difference in the earnings of black and white females in the same geographic region, but that the difference in earnings is attributable to differences in productivity and not to labor market discrimination. (2) White females faced reverse labor market discrimination; for example, in 1960 white females were discriminated against, relative to black females, by approximately 2%; in 1970 this figure had increased to approximately 3%. This increase in labor market discrimination is in part attributable to the increased participation of the white female in the labor market over this ten year period. Although data corroborates this finding, caution is suggested in the interpretation of this conclusion. (3) There esists a threshold level of discrimination against blacks; when the black

population reaches approximately 40%, discrimination is at its maximum. (4) The most important variables in determining income for both black and white females are education and work experience.

Data Restraints and Evaluation

A criticism of this work is its use, out of necessity, of aggregate cross-sectional data. The thesis would have had a sharper focus on the problem of the income differentials that existed between black and white females for the years of 1960 and 1970 if data on a given occupational class could have been obtained. Also, because of a lack of available data, there was no consideration given to those females employed on a part-time basis when data were collected for the analysis of income differentials. This in itself would have affected the salary levels, and thus the earnings, of black and white females.

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SOUTHERN SMSA'S, 1960 DATA APPENDIX A

SMSA	Median Education		Median Income		Labor Force Participation Rate of Black Females	Total Unemployment Rate	Black Male Unemployment Rate	Percentage of Blacks in Population	Median Age	
	Black	White	Black	White					Black	White
Charlotte	8.8	11.6	902	1446	53.8	3.7	4.9	27.905	22.9	29.1
Houston	9.9	11.3	941	1515	46.6	4.5	7.3	19.816	24.5	28.0
New Orleans	8.5	10.0	925	1355	38.2	5.9	9.9	30.798	24.6	31.4
Little Rock	8.3	10.7	914	813	28.5	3.8	6.9	18.582	25.8	30.4
Birmingham	8.8	10.6	718	1552	33.0	6.8	11.9	34.581	25.4	30.6
Mobile	8.8	10.5	786	1709	41.9	5.5	11.7	32.124	22.6	27.1
Atlanta	8.8	11.2	981	1570	47.5	4.1	4.5	38.252	25.7	29.1
Augusta	8.0	10.5	686	980	42.9	4.0	6.8	50.744	23.9	27.4
Miami	8.5	11.4	1124	1527	59.1	5.3	7.2	22.357	23.7	35.8
Jacksonville	8.7	10.8	868	1355	46.9	3.5	6.3	41.051	26.0	28.1
Nashville	9.1	10.8	870	1385	47.7	4.2	5.5	19.121	27.9	30.0
Memphis	8.5	10.7	776	1192	40.5	4.8	7.5	36.274	24.2	29.6
Louisville	9.1	10.3	946	1518	40.4	6.4	10.7	11.471	28.9	29.6
Richmond	9.1	11.3	1060	1703	41.7	3.0	6.5	26.283	27.5	32.6
Jackson	7.5	9.5	589	784	34.4	3.4	6.6	39.963	21.4	28.8
Washington	10.4	11.9	1895	2576	52.7	2.4	5.5	53.895	26.9	31.1
Huntington-Ashland	9.8	10.0	885	968	27.3	11.8	8.4	2.944	32.8	30.2
Baltimore	9.1	10.0	1263	1667	43.9	5.9	9.7	21.920	24.7	31.9
Charleston	8.3	11.0	731	1164	41.3	4.3	8.0	36.273	19.5	25.9
Oklahoma City	10.4	12.0	995	1437	43.4	3.7	6.3	8.024	23.3	29.6

NON-SOUTHERN SMSA'S, 1960 DATA APPENDIX B

SMSA	Median Education		Median Income		Labor Force Participation Rate of Black Females	Total Unemployment Rate	Black Male Unemployment Rate	Percentage of Blacks in Population	Median Age	
	Black	White	Black	White					Black	White
Denver	11.2	12.1	1563	1717	46.4	3.2	6.0	3.394	25.6	29.0
Kansas City	10.2	11.9	1151	1710	45.5	6.7	9.3	11.217	27.6	33.1
Fargo	12.2	12.1	767	765	100.0	3.0	0.0	.0002	16.8	27.1
Eugene	11.9	10.5	1398	1474	37.0	4.9	10.1	.002	21.7	27.8
San Bernardino	10.5	11.7	1125	1490	34.9	6.5	11.4	3.670	20.6	32.4
Debroit	10.1	11.0	1427	1706	35.9	6.9	18.0	14.854	26.1	30.2
Las Vegas	12.0	12.1	1885	2070	43.8	3.0	9.8	8.664	21.7	28.8
Billings	11.1	11.1	1085	1085	37.7	3.0	23.8	.002	23.6	26.4
Buffalo	9.4	10.6	1403	1586	34.4	7.0	15.7	6.343	23.9	32.1
New York	10.2	10.8	2035	2167	50.8	5.3	6.8	11.478	28.9	35.5
Pittsburg	9.9	10.8	1090	1384	31.8	9.3	16.5	6.713	28.7	36.1
Salt Lake City	10.8	12.2	957	1399	50.3	3.6	3.7	.004	24.6	29.1
Manchester	10.7	11.0	1638	1492	39.9	5.5	0.0	.002	21.8	34.4
Providence	10.0	10.1	1163	1607	38.6	7.0	9.8	1.764	22.7	37.4
Boston	10.8	12.1	1761	1833	29.6	4.3	7.3	3.003	26.7	33.9
Cleveland	10.2	11.1	1537	1742	42.6	5.0	12.6	14.320	26.7	33.0
Indianapolis	11.2	10.1	1373	1852	46.9	4.5	7.6	20.587	27.3	30.9
Portland	11.1	11.1	1058	1099	38.2	6.0	18.4	.003	26.5	34.4
Columbus	10.3	12.0	1326	1718	46.5	3.9	10.6	11.748	26.4	28.8
Gary	10.7	9.8	1355	1457	27.9	5.3	5.6	38.763	22.0	27.2

SOUTHERN SMSA'S, 1970 DATA APPENDIX C

SMSA	Median Education		Median Income		Labor Force Participation Rate of Black Females	Total Unemployment Rate	Black Male Unemployment Rate	Percentage of Blacks in Population	Median Age	
	Black	White	Black	White					Black	White
Charlotte	12.1	12.4	1919	2755	93.2	2.0	2.8	18.219	22.6	28.9
Houston	12.3	12.5	1813	2490	86.8	2.2	3.8	19.263	22.9	27.0
New Orleans	12.1	12.5	1659	2116	90.9	4.6	7.7	30.959	22.9	29.7
Little Rock	12.1	12.4	1889	2628	92.5	2.3	5.9	18.487	23.3	30.0
Birmingham	12.2	12.3	1393	1907	90.2	3.5	5.3	29.413	26.1	31.9
Mobile	12.2	12.3	1253	1800	89.3	4.5	7.9	29.985	22.9	28.7
Atlanta	12.2	12.5	2100	2886	94.0	2.3	3.8	22.344	24.5	28.3
Augusts	12.1	12.3	1618	2413	92.0	3.3	4.7	27.782	23.7	27.7
Miami	12.0	12.4	2163	2526	95.4	3.0	5.3	14.960	22.4	38.7
Jacksonville	12.2	12.4	2420	1691	92.6	2.1	4.8	22.341	24.6	28.7
Nashville	12.2	12.3	1861	2521	94.9	2.6	4.6	17.780	25.0	30.0
Memphis	12.1	12.4	1595	2212	91.3	2.9	7.2	29.724	22.7	29.3
Louisville	12.2	12.3	1928	2549	92.2	2.8	6.2	12.320	25.5	29.0
Richmond	12.1	12.3	2179	2857	95.1	1.8	3.5	25.127	25.7	30.8
Jackson	11.7	12.4	1442	2280	92.7	3.1	5.4	38.240	21.8	29.8
Washington	12.3	12.6	3645	3861	95.1	2.3	4.3	71.077	24.8	27.9
Huntington-Ashland	12.2	12.3	1520	1942	93.7	5.1	4.4	2.737	33.4	31.6
Baltimore	12.1	12.3	2499	2753	93.3	2.8	5.8	23.664	23.8	30.9
Charleston	12.0	12.3	1425	2165	91.6	3.8	5.3	31.191	22.1	25.4
Oklahoma City	12.4	12.5	2203	3505	94.0	2.9	5.0	3.372	22.5	28.8

NON-SOUTHERN SMSA'S, 1970 DATA APPENDIX D

SMSA	Median Education		Median Income		Labor Force Participation Rate of Black Females	Total Unemployment Rate	Black Male Unemployment Rate	Percentage of Blacks in Population	Median Age	
	Black	White	Black	White					Black	White
Denver	12.4	12.6	2642	2575	83.5	2.9	6.0	4.086	23.6	27.4
Kansas City	12.4	12.5	2411	2831	93.5	4.0	6.5	12.052	24.4	29.6
Fargo	12.6	12.7	2211	1663	100.0	2.6	0.0	.059	30.0	24.9
Eugene	12.6	12.5	4122	1973	100.0	3.5	12.1	.348	20.8	26.9
San Bernardino	12.3	12.4	2109	2260	91.2	4.8	11.1	13.991	21.7	29.4
Detroit	12.2	12.4	2740	2739	88.9	3.6	9.8	18.026	24.1	28.9
Las Vegas	12.3	12.4	2675	3088	93.8	2.6	5.2	11.195	20.1	27.5
Billings	12.4	12.5	1344	1803	100.0	2.6	0.0	.259	25.0	27.0
Buffalo	12.1	12.5	2544	2333	89.4	3.7	9.1	20.383	22.8	31.4
New York	12.2	12.4	3427	3260	95.2	3.2	5.2	16.292	26.8	35.0
Pittsburg	12.3	12.5	2027	2089	92.0	2.5	9.4	20.169	27.4	33.9
Salt Lake City	12.4	12.5	2054	1878	86.5	4.5	8.8	1.214	21.9	24.0
Manchester	12.8	12.4	2469	2361	100.0	2.7	0.0	.229	20.6	33.0
Providence	12.2	12.4	2215	2478	94.6	3.7	5.0	8.858	22.9	38.8
Boston	12.2	12.7	2939	2762	93.9	3.2	7.1	16.333	23.3	31.6
Cleveland	12.2	12.4	2623	2656	93.2	2.3	7.7	38.333	25.0	31.5
Indianapolis	12.1	12.3	2857	2794	91.8	2.4	8.5	18.037	24.3	28.5
Portland	12.2	12.4	2056	1961	100.0	2.9	18.4	.657	23.7	31.9
Columbus	12.3	12.5	2617	2640	94.5	2.3	5.9	18.460	24.2	27.0
Gary	12.3	12.4	2173	2202	87.6	2.8	4.4	52.843	22.1	27.0

NON-SOUTHERN SMSA's

VARIABLE	MEAN	STANDARD DEVIATION	COEFFICIENT OF VARIATION
EDWH	11.21	.770	.068727
EDBL	10.72	.718	.066976
YWH	1566.85	329.890	.210544
YBL	1354.85	319.702	.235968
BLMLUE	10.15	6.101	.601112
LFPR	42.94	14.953	.348269
PERBLPOP	7.83	9.515	1.215690
TUER	5.20	1.702	.327712

SOUTHERN SMSA's

VARIABLE	MEAN	STANDARD DEVIATION	COEFFICIENT OF VARIATION
EDWH	10.81	.667	.061718
EDBL	1.92	.744	.083387
YWH	1411.80	392.700	.278156
YBL	937.25	275.313	.293746
BLMLUE	7.61	3.153	.283162
LFPR	42.59	7.982	.187436
PERBLPOP	28.62	13.397	.468117
TUER	4.85	2.007	.413914

APPENDIX E CONT'D

COMBINED SMSA's

VARIABLE	MEAN	STANDARD DEVIATION	COEFFICIENT OF VARIATION
EDWH	11.01	.740	.067244
EDBL	9.82	1.160	.118200
YWH	1489.32	366.487	.246076
YBL	1146.05	362.542	.316340
BLMLUE	8.88	4.696	.529016
LFPR	42.76	11.832	.276710
PERBLPOP	18.22	15.569	.854373
TUER	5.02	1.846	.367447

NON-SOUTHERN SMSA's

VARIABLE	MEAN	STANDARD DEVIATION	COEFFICIENT OF VARIATION
EDWH	12.47	.103	.008265
EDBL	12.32	.176	.014325
YWH	2417.30	439.043	.181625
YBL	2509.25	580.245	.231242
BLMLUE	7.01	4.374	.623942
LFPR	51.29	13.813	.269339
PERBLPOP	13.59	13.527	.995262
TUER	3.14	.725	.230904

SOUTHERN SMSA's

VARIABLE	MEAN	STANDARD DEVIATION	COEFFICIENT OF VARIATION
EDWH	21.39	.093	.007533
EDBL	12.14	.143	.011768
YWH	2442.85	482.242	.197410
YBL	1926.20	534.876	.277684
BLMLUE	5.19	1.343	.259077
LFPR	50.07	5.293	.105731
PERBLPOP	24.39	14.195	.581766
TUER	2.99	.913	.304761

APPENDIX F CONT'D

COMBINED SMSA's

VARIABLE	MEAN	STANDARD DEVIATION	COEFFICIENT OF VARIATION
EDWH	12.43	.106	.008542
EDBL	12.23	.183	.014949
YWH	2430.07	455.382	.187394
YBL	2217.72	624.956	.281801
BLMLUE	6.10	3.325	.545242
LFPR	50.68	10.343	.204113
PERBLPOP	18.20	14.739	.775961
TUER	3.07	.817	.266318